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# Spatial distribution of sodium on Mercury

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We have analyzed a collection of about a thousand images of sodium emission distribution on Mercury to obtain statistical information as to the north-south and east-west distribution of sodium. In our images, sodium is frequently evenly distributed north-south (in part due to seeing blur), however excess sodium is often observed in either the northern or southern hemisphere. Excess emission occurred in the southern hemisphere more than twice as often as in the northern hemisphere. The excess north and south emissions seem to appear at random intervals of true anomaly and sub-earth longitude. The apparently random nature of these occurrences suggests an external cause, one not correlated with any characteristic of the planetary geochemistry or the planetary orbit. Rather, we suggest that they are the result of solar weather, whereby solar particles are precipitated to the surface toward high latitudes, and produce localized sources of sodium.

East-west ratios, where the dusk terminator was in view, showed values greater than unity, indicating that the sunlit limb was brighter than the sunset terminator, as expected. When the dawn terminator was in view on the east side of the planet, we expect east-west ratios smaller than unity when limb brightening dominates. However, the ratios should be larger when dawn enhancement does occur, perhaps equaling or exceeding unity. This was indeed the case for more than half of the observations, but not all of them. There are puzzling features. Near perihelion, the rate of exposure of surface to sunshine slows down and actually changes sign. During this time, one might expect that dawn terminator enhancement might be negligible, and we should see east-west ratios less than unity. Nevertheless, some dawn enhancement was observed, with ratio values near unity. Possibly, this was the result of preferential precipitation of sodium ions on the dawn hemisphere. Then, for true anomaly angles near aphelion, the dawn enhancement effect was replaced by limb brightening. Possible explanations

include temperature effects that move the locus of sodium evaporation towards the limb, and changes in the electric field that controls ion recycling.